

IN THE CLAIMS:

Claims 1-3, 7, 8, and 10 have been amended herein. All of the pending claims 1 through 10 are presented below. This listing of claims will replace all prior versions and listings in the application. Please enter these claims as amended.

1. (Currently Amended) An apparatus for introducing deadspace into a breathing circuit, comprising:
a primary expiratory pathway through the breathing circuit;
a deadspace portion of the breathing circuit located to receive gases exhaled by a patient upon positioning the breathing circuit in communication with an airway of the patient, ~~said the~~ deadspace portion communicating with ~~said the~~ primary expiratory pathway ~~at at at least~~ at least one junction thereof ~~with said primary expiratory pathway~~;
a flow restrictor positioned along ~~said the~~ primary expiratory pathway, downstream from ~~said the~~ at least one junction; and
a two-way valve located and positionable so as to, along with ~~said the~~ flow restrictor, prevent gases from flowing into ~~said the~~ deadspace portion and allow gases to flow into ~~said the~~ deadspace portion.
2. (Currently Amended) The apparatus of claim 1, wherein ~~said the~~ deadspace portion comprises at least a ~~volume~~ volume-adjustable section.
3. (Currently Amended) The apparatus of claim 2, wherein ~~said the~~ volume volume-adjustable section is length expandable and length contractible.
4. (Original) A method for estimating the partial pressure of carbon dioxide in the alveolar blood (PACO₂) of an individual, comprising:

calculating a concentration of carbon dioxide in a parallel deadspace (PDS_{CO_2}) of an airway of the individual on a breath-by-breath basis; and
determining a partial pressure of end tidal carbon dioxide ($PetCO_2$) of the individual.

5. (Original) The method of claim 4, further comprising determining a perfusion ratio (r).

6. (Original) The method of claim 5, wherein:

$$PACO_2 = [PetCO_2 - (1 - r) \times PDS_{CO_2}] / r.$$

7. (Currently Amended) The method of claim 4, wherein ~~said~~ calculating comprises:
determining a mixed inspired volume of carbon dioxide ($ViCO_2$) inhaled by the individual;
at least estimating an airway deadspace of the individual;
determining a partial pressure of end tidal carbon dioxide ($PetCO_2$) of a previous breath of the individual; and
determining a tidal volume (V_t) of the individual's breathing.

8. (Currently Amended) The method of claim 7, wherein ~~said~~ calculating further comprises:
at least estimating a functional residual capacity (FRC) of alveoli of the individual's lungs.

9. (Original) The method of claim 8, wherein

$$PDS_{CO_2}(n) = \{ [FRC / (FRC + V_t)] \times PDS_{CO_2}(n-1) \} + \\ \{ [ViCO_2 + (deadspace \times PetCO_2(n-1))] / V_t \} \times [V_t / (V_t + FRC)],$$

where (n) indicates a parameter for a current breath and ($n-1$) represents a parameter for an immediately preceding breath.

10. (Currently Amended) A method for estimating the cardiac output of an individual, comprising:

- determining a carbon dioxide elimination (V_{CO_2}) of the individual for a before re-breathing period and for a during re-breathing period;
- calculating a carbon dioxide elimination difference between ~~said~~ the carbon dioxide elimination of ~~said~~ the before re-breathing period and ~~said~~ the carbon dioxide elimination of ~~said~~ the during re-breathing period;
- estimating a partial pressure of carbon dioxide in alveolar blood (P_{ACO_2}) of the individual for ~~said~~ the before re-breathing period and for ~~said~~ the during re-breathing period respectively based on partial pressure of end tidal carbon dioxide (P_{etCO_2}) measurements of the individual during ~~said~~ the before re-breathing period and during ~~said~~ the during re-breathing period;
- converting each estimation of ~~said~~ the partial pressure of carbon dioxide in alveolar blood to a carbon dioxide content (C_{CO_2});
- calculating a carbon dioxide content difference between ~~said~~ the carbon dioxide content of ~~said~~ the before re-breathing period and ~~said~~ the carbon dioxide content of ~~said~~ the during re-breathing period; and
- dividing ~~said~~ the carbon dioxide elimination difference by ~~said~~ the carbon dioxide content difference.